

AMENDMENT UNDER 37 C.F.R. § 1.111  
Application No.: 10/578,267

Attorney Docket No.: Q94679

OK TO ENTER: /KN/

02/14/2008

**AMENDMENTS TO THE SPECIFICATION**

**Please replace the paragraph no. [0014] of US Publication No. 2007/0146169 A1, with the following amended paragraph:**

The present invention is made on the basis of the circumstances as mentioned above, an object of the present invention is to provide a control unit for electric power steering apparatus which can detect an abnormality of an angle detecting device of a motor used in the control apparatus unit of the electric power steering apparatus, an abnormality of an incomplete disconnection state (a rare short) and the like rapidly, without being a burden to a CPU and without having need of addition of a lot of hardwares.

**Please replace the paragraph no. [0015] of US Publication No. 2007/0146169 A1, with the following amended paragraph:**

On the other hand, in the electric power steering apparatus, it is necessary to correctly execute a motor control in such a manner as to output a desired torque in correspondence to a handle operation of a driver. Further, in order to correctly control the motor, it is necessary to detect a state of the electric power steering apparatus by utilizing various sensors. Since a detected signal obtained from the sensor is very important for controlling the electric power steering apparatus, it is necessary to quickly detect a failure of the sensor so as to execute a control and a protection in correspondence thereto. For example, the control after detecting the failure of the motor angle detecting device corresponding to one of the sensors is a very important problem for a safety steering of the vehicle, and various control apparatus unit have been conventionally considered.

AMENDMENT UNDER 37 C.F.R. § 1.111  
Application No.: 10/578,267

Attorney Docket No.: Q94679  
OK TO ENTER: /KN/

02/14/2008

**Please replace the paragraph no. [0016] of US Publication No. 2007/0146169 A1,  
with the following amended paragraph:**

As one example, a description will be given of a control apparatus unit in Japanese Patent Application Publication No. 2003-26020 with reference to Fig. 5.

**Please replace the paragraph no. [0035] of US Publication No. 2007/0146169 A1,  
with the following amended paragraph:**

Fig. 5 is a block diagram showing an example of a conventional control apparatus unit corresponding to an abnormality in detecting a rotation angle of a motor;

**Please replace the paragraph no. [0048] of US Publication No. 2007/0146169 A1,  
with the following amended paragraph:**

A basic idea of the present invention is constituted by a value corresponding to a  $\sin \theta$  and a value corresponding to a  $\cos \theta$ , prepares an abnormal region judging map constituted by a normal region and an abnormal region, detects an angle information  $\sin \theta$  and  $\cos \theta$  on the basis of an angle information  $\sin \omega t \cdot [\cos] \sin \theta$  and  $\sin \omega t \cdot [\sin] \cos \theta$  corresponding to an information obtained from an angle detecting device such as an angular resolver or the like, and judges abnormal or normal by mapping them on the abnormal region judging map as they are without calculating them.

**Please replace the paragraph no. [0121] of US Publication No. 2007/0146169 A1,  
with the following amended paragraph:**

In the case that the structure is provided with the angle processing means which can detect the  $\sin$  angle signal and the  $\cos$  angle signal respectively from the  $\sin$  signal and the  $\cos$  signal, and can detect the rotation angle signal formed by the signal formed from the detected  $\cos$  angle signal and the signal formed from the  $\sin$  angle signal, since the rotation angle signal is

AMENDMENT UNDER 37 C.F.R. § 1.111

Attorney Docket No.: Q94679

Application No.: 10/578,267

OK TO ENTER: /KN/

02/14/2008

equivalent to the rotation angle signal output by the Hall sensor arranged around the motor, there

can be obtained an effect that it is possible to provide the control apparatus unit of the electric power steering apparatus which can control the motor by the rectangular wave current. For example, in the case that the motor is constituted by the three-phase motor, if the structure is provided with an angle processing means which can detect a three-bit rotation angle signal formed by a one-bit signal indicating positive or negative of the cos angle signal and a two-bit signal indicating a level of the value of the sin angle signal, since the three-bit rotation angle signal is equivalent to the rotation angle signal output by the Hall sensors arranged per 120 degree around the three-phase motor, there can be obtained an effect that it is possible to provide the control apparatus unit of the electric power steering apparatus which can control the motor by the rectangular wave current.